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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/635,318	08/06/2003	David Cope	EMI 02.02	8133
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HAYES SOLOWAY P.C. 3450 E. SUNRISE DRIVE, SUITE 140 TUCSON, AZ 85718			EXAMINER MULLINS, BURTON S	
			ART UNIT 2834	PAPER NUMBER
			MAIL DATE 07/31/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/635,318

Applicant(s)

COPE ET AL.

Examiner

Burton S. Mullins

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 30 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-26, 29-31 and 44-46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-26, 29-31 and 44-46 is/are rejected.
- 7) ☒ Claim(s) 13 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 102***

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
2. Claims 1-12, 14-26, 29-31 & 44-46 are rejected under 35 U.S.C. 102(e) as being anticipated by Corcoran (US 6,664,666). The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

With respect to claims 1, 17, 24 & 44-46, Corcoran teaches a multiple degree-of-freedom motor comprising: An output shaft (Fig. 21, #702); a stator comprising first (Fig. 21, #714D) and second (Fig. 21, #714B) lamination stacks, each of said stacks having an interior curved surface and a coil (Paragraph 106) wound thereon, said stacks being disposed asymmetrically adjacent said output shaft, whereby each of said lamination stacks in without a complimentary, similarly positioned lamination stack on an opposing side of said output shaft (the first and second stacks do not functionally compliment each other, nor are they similarly positioned); and a rotor (Fig. 21, #704) fixed to said output shaft and movably supported adjacent said stator with an air gap disposed between said rotor and said stator, said rotor including at least one magnet (Paragraph 107) disposed thereon and being movable along said first said interior curved surface of said stacks in directions defining at least first and second degrees of freedom; wherein energization of

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the coil of said first stack establishes a first magnetic field to urge said output shaft/rotor to rotate both clockwise and counter-clockwise in a first plane, and wherein energization of the coil of said second stack establishes a second magnetic field to urge said output shaft/rotor to rotate both clockwise and counter-clockwise in a second plane substantially orthogonal to the first plane (as seen, for example in Fig. 21).

With respect to claims 2 & 18, Corcoran teaches the motor of claims 1 & 17, wherein said first degree of freedom is substantially perpendicular to a longitudinal axis of wires of one of said coils associated with the first degree of freedom, and said second degree of freedom is substantially perpendicular to a longitudinal axis of wires of the other of said coils (as seen in Figs. 21 & 22).

With respect to claim 3, Corcoran teaches the motor of claim 1, wherein said interior curved surface substantially defines a portion of a sphere (as seen in Fig. 21).

With respect to claim 4, Corcoran teaches the motor of claim 1, wherein said curved interior surface is uniformly curved (as seen in Fig. 21).

With respect to claim 5, Corcoran teaches the motor of claim 1, wherein said interior curved surface has a plurality of slots formed therein (as seen in Fig. 21).

With respect to claim 6, Corcoran teaches the motor of claim 5, wherein said slots lie on planes substantially parallel to one another.

With respect to claim 7, Corcoran teaches the motor of claim 1, wherein said lamination stack comprises a plurality of laminations radially disposed about a center point, wherein a plane of each lamination extends through said center point (as seen in Figs. 21 & 22).

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With respect to claim 8, Corcoran teaches the motor of claim 1, wherein at least one lamination stack has an interior curved surface (the tooth tips) with no slots formed therein.

With respect to claims 9 & 19, Corcoran teaches the motor of claims 1 & 17 wherein at least one said magnet is a permanent magnet.

With respect to claims 10,20 & 25, Corcoran teaches the motor of claims 1,17 & 24, wherein at least one said magnet is faceted (such as is described in Paragraph 82).

With respect to claims 11 & 21, Corcoran teaches the motor of claims 1 & 17, wherein the output shaft is also an input shaft.

With respect to claims 12 & 22, Corcoran teaches the motor of claims 1 & 17, further comprising at least one sensor (of the type as taught in Fig. 7, #64) for detecting movement of said input shaft.

With respect to claim 14, a “communications interface” comprising an applications controller 74 such as a flight simulation computer running software for a simulation program provides an output to power the motor controller 76 which in turn energizes the coils and provides an output force to the user through the joystick (c.10:39-56; Fig.8). Thus, the applications controller 74 “provid[es] input and/or output signals to detect and/or control the position of said output shaft [joystick]”.

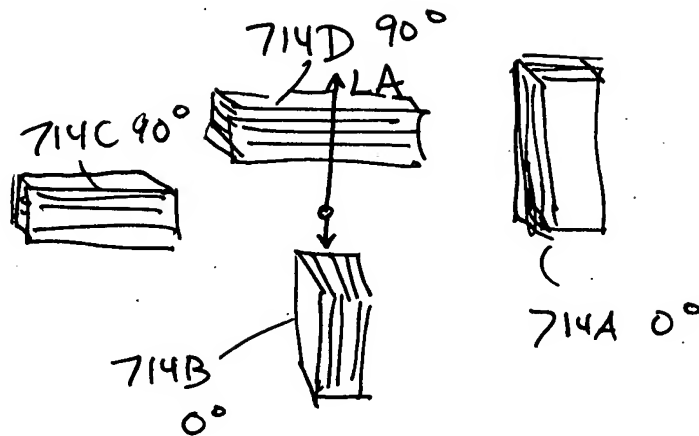
With respect to claims 15,16,23 & 26, Corcoran teaches the motor of claims 1,17 & 24 wherein, said stator further comprises a third lamination stack (Fig. 21, #714A); having an interior curved surface and a coil wound thereon; wherein said third lamination stack is substantially orthogonal to said first and second lamination stacks; wherein said rotor includes at least one magnet disposed thereon and being movable along said interior curved surface of said

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third lamination stack in a direction defining a third degree of freedom; wherein energization of the coil of said third lamination stack establishes a third magnetic field to urge said output shaft to rotate in a third plane substantially orthogonal to each of said first and second planes (as seen in Figs. 21 & 22).

With respect to claim 29, in the embodiment described in c.15:1-23, Corcoran teaches that lamination stacks 714B and 714D are oriented such that their laminations are parallel (angle of  $0^\circ$ ) and perpendicular (angle of  $90^\circ$ ), respectively, to the output shaft axis LA (Fig.21). The lamination stacks 714A and 714C may be similarly oriented, such that the planes formed by their respective laminations form first and second angles, i.e.  $0^\circ$  and  $90^\circ$  (c.15:18-21). In such a case--which is not shown in the drawings---the laminations in stack 714A would be parallel with those in 714B and both would be parallel to axis LA (angle of  $0^\circ$ ); and the lamination in stack 714C would be parallel with those in 714D and both would be perpendicular to the axis LA (angle of  $90^\circ$ ). See the examiner's drawing below. Thus, a stator comprising a first lamination stack 714A and a second lamination stack 714B, said lamination stacks disposed perpendicular to one another, each lamination stack having a curved interior surface facing the rotor and a coil wound thereon; and wherein the laminations of the first lamination stack 714A and second lamination stack 714B are substantially parallel to one another (both at angle  $0^\circ$ ) and asymmetrically adjacent to said output shaft (stacks 714A and 714B are perpendicular to each other), whereby each of said lamination stacks 714A and 714B is without a complimentary, similarly positioned lamination stack on an opposing side of said output shaft, since the opposing stacks 714C and 714D are oriented such that their laminations are at and angle of  $90^\circ$  with respect to the axis LA.

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Regarding claim 30, energization of the coil of the first lamination stack 714A establishes a first magnetic field to urge said output shaft to rotate in a first plane, and wherein energization of the coil of the second lamination stack 714B establishes a second magnetic field to urge said output shaft to rotate in a second plane (planes of rotation of stacks 714A and 714B are perpendicular since the respective stacks are perpendicular).

Regarding claim 31, the stator further comprises a third lamination stack 714C having an interior curved surface and a coil wound thereon (Fig.21); wherein the laminations of the first and second lamination stacks are substantially perpendicular to the laminations of the third lamination stack 714C (714 is at an angle of  $90^\circ$  while 714A and 714B are at angle  $0^\circ$ ); and wherein energization of the coil of the third lamination stack establishes a third magnetic field to urge said output shaft to rotate in a third plane substantially orthogonal to said first and second planes.

***Allowable Subject Matter***

3. Claim 13 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Corcoran does not teach a cooling fan. Further, Corcoran qualifies as prior art only under 102(e) and is not available as a reference per 103(c) since the subject matter and the claimed invention were, at the time the claimed invention was made, owned by the same person or subject to an obligation of assignment to the same person

***Response to Arguments***

4. Applicant's arguments filed 30 April 2007 have been fully considered but they are not wholly persuasive. Regarding the rejection of claims 15-16, 23 and 26 under 35 USC 112, first paragraph, applicant's arguments are persuasive and the rejection has been withdrawn. Regarding the rejection of Claims 1-9, 11, 12, 14, 17-19, 21, 22, 24, 29, 30 & 44-46 over Moore et al., the examiner agrees with applicant that Moore's transducer magnet 96a/96b moves along the interior curved surface of stack 70a (Fig. 5a) in a direction defining one degree of freedom, i.e. the magnet rotates---not two degrees of freedom as claimed. Therefore the rejection over Moore has been withdrawn.

Regarding the rejection of claims 1-12, 15-26 and 44-46 under 35 USC 102(e) by Corcoran, applicant argues that Corcoran does not teach the limitation of "each of said lamination stacks is without a complimentary, similarly positioned lamination stack on an opposing side of said output shaft" since in Fig. 21 lamination stack 714A and 714C are both similarly and complementarily positioned on opposite sides of the output shaft. However,



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applicant has failed to consider the description in c.15:15-23 describing the lamination stacks 714A and 714C. It is noted that the stacks “may be oriented such that that a plane formed by a lamination in the lamination stacks 714A and 714C form a first and a second angle with the longitudinal axis of the output shaft 702. The first and the second angle may be the same [as shown in Fig.21] or may be different.” Thus, when the first and second angles are different, the opposed stacks are not complimentary and similarly positioned relative to the output shaft. The same argument holds true regarding the coil limitations in claims 17, 24, 44 and 46 because if the lamination stacks which hold the coils are not complimentary and similarly positioned relative to the output shaft, neither are the coils.

### ***Conclusion***

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Burton S. Mullins whose telephone number is 571-272-2029. The examiner can normally be reached on Monday-Friday, 9 am to 5 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Darren Schuberg can be reached on 571-272-2044. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Burton S. Mullins  
Primary Examiner  
Art Unit 2834

bsm  
22 July 2007